

DOCUMENT RESUME

ED 326 655

CE 056 405

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TITLE A Comparison of Competency-Based Instruction with
Conventional Instruction in the Home Economics
Classroom.
PUB DATE 90
NOTE 23p.; Based on a presentation made at the American
Vocational Association Convention (Cincinnati, OH,
November 30-December 4, 1990).
PUB TYPE Speeches/Conference Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Competence; *Competency Based Education; *Cooking
Instruction; High Schools; Home Economics; *Inservice
Teacher Education; *Outcomes of Education; Pretests
Posttests; Teacher Effectiveness; *Teaching Methods;
Workshops

ABSTRACT

This study compared student learning in secondary consumer and homemaking foods classes using three different methods of teacher preparation. In Method 1, teachers were provided with lists of competencies and workshop training for using the competencies. In Method 2, teachers were provided with lists of competencies and no workshop training; and in Method 3, teachers had neither lists of competencies nor workshop training. The sample included 344 students from 18 Utah high school nutrition and foods classes, using a unit on baking yeast breads. A pretest/posttest research design was used, and results were assessed using analyses of variation. The study found that (1) there was no significant difference in student learning between the three groups tested when each method was compared independently; (2) a significant difference was found when Method 1 and Method 2 were grouped together and compared with Method 3; and (3) teacher variables analyzed did not show a significant impact on student scores. Further research was recommended, with expectations that it would show greater gains for Method 1. (KC)

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ED326655

A COMPARISON OF COMPETENCY-BASED INSTRUCTION WITH
CONVENTIONAL INSTRUCTION IN THE HOME ECONOMICS CLASSROOM

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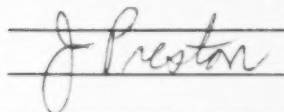
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Abstract

This study compared student learning in secondary consumer and homemaking foods classes using three different methods of teacher preparation: Method 1-teachers provided with lists of competencies and workshop training for using the competencies; Method 2-teachers provided with lists of competencies and no workshop training; and Method 3-teachers without lists of competencies or workshop training.

The sample included 344 students from 18 high school nutrition and foods classes.

Based on the findings, the following conclusions were drawn:

a) no significant difference in student learning was found between the three groups tested when each method was compared independently; b) a significant difference was found when Method 1 and Method 2 were grouped together and compared with Method 3; and c) teacher variables analyzed did not show a significant impact on student scores.

Introduction

Much work has been done in the area of Competency Based Education (CBE). Hall (1976) states that "competency-based education is a new approach to teaching" (p. 127). Competency Based Education, as defined by McAshan (1979), is an educational program in which the desired learning outcomes are specified in advance and relate to knowledge, skills, and abilities that a person achieves. Over the years, competency-based education has taken on names such as programed learning, mastery learning, performance-based instruction, and task-oriented education. "These terms are not entirely synonymous but are loosely interchangeable" (Black, 1984, p. 1).

A number of states have devoted many hours and have appropriated money for the development of curricula, guidelines and teaching modules to build CBE programs. Illinois, Pennsylvania, and Ohio have been leaders in converting curricula to the competency-based format. States such as Montana (Montana State University, 1980), Texas (Texas Tech University, in cooperation with Texas Education Agency, Department of Occupational Education and Technology, 1984), North Carolina (North Carolina Department of Public Instruction, Division of Vocational Education, 1985), and Alaska (Alaska State Department of Education, Division of Adult and Vocational Education, 1986) have completed competency-based curricula for the area of home economics.

The Utah State Board for Vocational Education decided in January 1984 to rewrite the state curriculum to meet the competency-based education format. The specialist for Consumer and Home Economics asked that a list of competencies be identified for each course taught in secondary occupational home economics programs. A coordinated effort was organized to develop competencies by representatives from related industries and occupational teachers for foods, clothing, child care, and interiors.

Test questions were then written for the identified competencies and placed in a question bank organized for easy access on a computer management system. Selected teachers participated in workshop training on how to utilize the competencies, coordinate curriculum, and use a computer management system to access competencies and coordinating questions. In August 1986, the Utah State Board for Vocational Education purchased membership in the Vocational-Technical Education Consortium of States (V-TECS) to add support to this transition period in redefining Utah Vocational Education courses.

Santer (1985) states that it is the responsibility of state education agencies and institutions of higher education to provide teacher training programs. Van Cleaf and Reinharts (1984) suggest that school districts should share in the responsibility of providing in-service programs to teachers for the purpose of improving teacher effectiveness. They suggest

that teachers need time when a new concept is presented: time to comprehend, to practice, and to feel comfortable with the new information. Several in-service workshops are needed in which teachers receive guidance and support. Without this guidance and support, the new concept will not become part of the teachers' teaching practice.

This study was an outgrowth of Utah's involvement with competency-based education. The Utah State Office of Education conducted workshops to train interested in-service teachers of consumer and home economics and occupational home economics in the use of the competencies and question banks.

As a result of these workshops and the new availability of Utah's lists of competencies for occupational foods this study was designed. Support for CBE is universal throughout the United States, but little research has been done or is being done to evaluate its effectiveness (Buttram, Kershner, & Dusewicz, 1985). The need to evaluate CBE is timely for Utah home economics programs since the Utah State Office of Education has converted all occupational home economics programs to a competency-based format. The intent was to compare student test scores on a yeast breads unit taught in secondary foods classes by teachers who had experienced different methods of preparation: (a) teachers who used competency lists and who had workshop training, (b) teachers who used competency lists, but who had no workshop training, and (c) teachers who had neither competency lists nor workshop training.

Methodology

Three hundred and forty-four students enrolled in 18 high school vocational consumer homemaking foods classes in Utah served as the sample for this study. Consumer and homemaking classes were used because the number of occupational food programs in Utah were too few to select from. A unit on yeast breads was chosen because it is traditional to both consumer and homemaking and occupational foods courses.

The teachers consented to teach a unit on yeast breads between January and May of 1988. They agreed to teach the yeast breads unit and administer a pretest/posttest evaluation. Eighteen teachers were organized in three groups of six, selected from schools having 4A or 3A classifications or by the number of home economics teachers in the department.

All students participating in this study were taught a yeast breads unit. The 18 teachers developed their own learning activities to use in teaching the unit. The teachers were grouped according to teacher preparation which included: (a) teachers who used competency lists and who had workshop training, (b) teachers who used competency lists but who had no workshop training, and (c) teachers who had no competency lists and no workshop training.

Instrumentation

An equivalent pretest/posttest research design group was used. The test was developed from the bank of questions provided to Utah teachers by the Utah State Board for Vocational Education

plus-three recently developed high school yeast bread unit tests. This test instrument was then piloted at a Utah High School; an item analysis performed at Utah State University determined that the test was too easy.

The test was also evaluated by two nutrition and food science specialists at Utah State University for content validity. The professors were asked to evaluate each question for clarity, for accuracy, and for measuring achievement of specific competencies. As a result of the item analysis on the first test and the review of face validity by the two nutrition specialists, many test questions were eliminated and many were rewritten to increase the level of difficulty. A second pilot was conducted on the revised test at another Utah high school; the schools were similar in size and location. A frequency test computed the percentages of correct answers for each question. On the recommendation from the statistician, a posttest question which 66-75% of students answered correctly would be a good question to include on the final test instrument. Nineteen questions were added to the first part of the test for three reasons:

1. The added questions were easier and would serve as a warm-up section. The students would feel more comfortable about taking the test and would have a more positive attitude after completion.

2. The questions would serve as a safeguard for teachers who might look at the test and teach to the questions.

3. If the teachers glanced at the questions, they would be comfortable knowing the test included both difficult and easy questions.

The final test consisted of 60 items. The first five items gathered demographic data about the students. Items 6 through 24 were the 19 added "warm-up" questions. These questions were taken from the pilot test and showed on the item analysis as being too easy. These questions were deleted from the final analysis. Items 25 through 60 were analyzed for this study.

The 18 teachers administered a pretest, taught a 5-7 day unit depending on the class length, and then administered the posttest.

Data Analysis

Two analyses were completed using ANCOVA. The first analysis considered only the student scores and the method used to prepare teachers. The second statistical treatment analyzed the student scores and the method of teacher preparation with the addition of several teacher demographic variables used as covariates.

The pairwise differences of the adjusted posttest scores using the LSD test compared pairs of groups. This analysis was used to determine if the difference was significant for the three methods of teacher preparation.

Results

Frequency distributions were created for each teacher using demographics for the purpose of describing the teacher sample

(Table 1 shows the teacher demographic variables.) Most teachers were between 26 and 40 years of age. Approximately half the teachers received training in undergraduate degree programs; nine in district workshops; and some in graduate programs.

Eight teachers taught foods classes as a first choice, four as a second choice and five teachers were assigned to teach foods. The demographic variable for professional organization participation shows a larger number of teachers belonging to vocational organizations, five belonged to the American Home Economics Association (AHEA) and five to the Utah Home Economics Association (UHEA).

Insert Table 1 About Here

Student demographics were collected to describe the student sample. Sixty-four percent, 211, were female, with 117 or 35.7 percent males. A greater number of students were in the 11th and 12th grades; most students placed themselves in these classes. Table 2 also shows who influenced students to register for a foods class with 214, or 65.2 percent, deciding for themselves.

Insert Table 2 About Here

The first analysis in Table 3 illustrates the F value for the pretest scores as significantly related to the posttest scores. The F test for methods was significant at .003, showing

a significant difference in student scores between the three methods of teacher preparation. The Multiple R squared value was .073.

Insert Table 3 About Here

Table 4 shows the highest mean scores for students whose teachers had workshop training and competency lists or competency lists only. The lowest scores represent students whose teachers had no lists of competencies and no workshop training.

Insert Table 4 About Here

A 95 percent confidence interval with a difference between two means was computed for each pair of means. To interpret this score see Table 5. If zero was found in the interval between the two numbers, those two compared means were not significantly different from each other. This LSD pairwise test suggests the difference between training Method 1 (competency lists and workshop training) and Method 2 (competency lists) was not significant. However, a significant difference did occur when comparing methods 1 with 3 and 2 with 3. Teacher Method 1 (workshop training and competency lists) and teacher Method 2 (competency lists without workshop training) suggest a positive effect on student posttest scores.

Table 5 also shows the mean on the pretest and the mean on the posttest for all three methods of teacher preparation. The student's knowledge gain from pretest to posttest was statistically significant and greater for Methods 1 and 2. However, the difference was not of practical significance. Note that the average increase was 4 points, and the students knew an average of 20 out of 36 items on the posttest.

Insert Table 5 About Here

A second analysis using ANCOVA was performed as a control to evaluate if the teacher demographic variables had an effect on student scores. Teacher demographic variables did have an effect on students scores; however, it did not change the general trend of the results from the first analysis. The F values in Table 6 were used to determine significance at the .05 level.

Insert Table 6 About Here

The students' pretest scores were significantly related to the posttest scores. The covariates (teacher demographic variables) significantly affecting student scores were professional organizations, years of teaching home economics, age of teachers, number of home economics classes taught, and methods used. The Multiple R-squared value was .279.

Table 7 shows the raw regression coefficients for each teacher covariate. This supplementary table was included to emphasize the direction of the effect (positive or negative) of the coefficient.

Insert Table 7 About Here

Conclusions

The highest mean scores occurred for students whose teachers had both competencies and workshop training. Students achieved next highest mean on posttest scores when teachers had lists of competencies only. The lowest scores represent students whose teachers had no list of competencies and no workshop training.

The following conclusions were drawn from the findings of this study.

1. When methods of preparation for teachers who used competency lists and had workshop training (Method 1) and teachers who used competency lists but had no workshop training (Method 2) were compared with teachers who had neither competency lists nor workshop training (Method 3), there was a significant difference.

2. Methods 1 and 2, when compared with Method 3 individually, were not great enough in difference to be of practical value.

3. Teacher differences, according to the list of demographic variables analyzed in this study, did not show a significant impact on student scores.

Discussion

Pretest scores ranged from 18 to 20 out of a possible 36 for three different methods of teacher preparation. Teachers in this study may have covered unnecessary information students were well aware of rather than using the time to present new information.

The authors suggest additional training be implemented to help teachers develop curriculum based on pretest questions so competencies and relevant knowledge and skills already achieved by students will not be repeated.

The 95% confidence interval with a difference between two means was computed for each pair of means. This supports the conclusion that competencies plus workshops are not significantly different from competencies alone; however, when comparing training Method 1 and 2 with Method 3, a significant difference is shown for both comparisons.

The teacher demographics were investigated using analysis of covariance (ANCOVA). Although there were no significant results, the process was used for control in this study. The demographic variables did not change the general trend of the results from the first analysis, only strengthened the conclusion that the three methods produced student gains in knowledge that are different from each other even if mathematically controlled by

all students' scores as if all the teachers had been exactly the same.

The authors feel another study at this time would show greater gain scores for Method 1, teachers with in-service training and competency lists. More teachers have regular access to computers for the management of their classroom instruction in

Utah and appear more comfortable with software designed question banks organized for each occupational course.

The implications of this study are important for future preservice and in-service teacher preparation programs for those states and school districts electing to use Competency-Based Education.

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Table 1: Teacher Demographic Variables Used as Covariates

Age of the teacher	Frequency	Percent
20-25 years old	1	5.6
26-30 years old	6	33.3
31-35 years old	3	16.7
36-40 years old	4	22.2
41-45 years old	1	5.6
46-50 years old	1	5.6
51-55 years old	2	11.1
Formal training to teach foods	Frequency	Percent
Undergraduate foods classes	17	.94
Graduate foods classes	3	.17
Classes offered by district for credit	9	.50
Other	4	.22
Teacher choice in teaching consumer and homemaking foods classes	Frequency	Percent
First choice	8	.44
Second choice	4	.22
Third choice	0	.00
Assigned by principal or department head	5	.28
Other	2	.11
Membership in professional organizations	Frequency	Percent
American home Economics Association (AHEA)	5	.28
Utah Home Economics Association (UHEA)	5	.28
American Vocational Association (AVA)	12	.67
Utah Vocational Association (UVA)	13	.72
Utah Association for Vocational Home Economics Teachers (UAVHET)	10	.56
Left question blank	4	.22

Note: n = 18

Table 2:

Sex of students	Frequency	Percent
Male	117	35.7
Female	211	64.3
Grade in high school	Frequency	Percent
10th grade	82	25.0
11th grade	119	36.3
12th grade	115	35.1
Marked wrong	10	3.1
Missing data	2	.6
How student was placed in the foods class	Frequency	Percent
Your choice	269	82.0
Placed by the counselor	19	5.8
School scheduling problems	12	3.7
Combination of placed by the counselor and school scheduling problems	23	7.0
Missing data	5	1.5
Who influenced you the most to register for a foods class?	Frequency	Percent
Family	16	4.9
Friends	48	14.6
Home economics teacher	10	3.0
Your choice	214	65.2
Counselor	36	11.0
Missing data	4	1.2

Note: n = 344

Table 3

Analysis of Covariance on Student Posttest Scores by Method Using the Student
Pretest Score as the Covariate

Method	<u>df</u>	Mean squared	F	Significance of F
Pretest	1	602.8	17.9	.000
Methods	2	199.4	5.9	.003
Error	340	33.7		
TOTAL	343			

Table 4

Adjusted Posttest Means and Standard Deviations for the Three Teaching Methods

Method	Sample	Mean	Standard deviation of the mean
1 - Competencies and workshop	116	23.84	.53918
2 - Competencies and no workshop	127	22.94	.51931
3 - No competencies and no workshop	101	21.13	.58332

Table 5

Pairwise t-Tests Between Pretest and Posttest Student Scores overall and Separately for Each Method

Method	<u>N</u>	Pretest mean	Posttest mean	<u>t</u> value	Significance of <u>t</u>
Method 1 - Competencies and workshop	116	19.59	23.84	9.41	.000
Method 2 - Competencies and no workshop	127	18.52	22.67	7.31	.000
Method 3 - No competencies and no workshop	101	20.87	21.48	.66	.512
All three methods	344	19.57	22.27	8.21	.000

Table 6

Analysis of Covariance on Student Posttest Scores by method, Student Pretest Score, Adjusting for Teacher Variables

Covariate	df	Mean squared	F	Significance of F
Pretest score	1	726.30	27.124	.000
Formal education	1	38.99	1.456	.228
Teaching choice	1	78.48	2.931	.088
Professional organizations	1	273.54	10.216	.002
Years teaching home economics	1	764.80	28.562	.000
Age of teacher	1	1336.42	49.910	.000
Class enrollment	1	88.79	3.316	.069
Number of classes taught	1	115.31	4.306	.039
Methods	2	184.25	6.881	.001
Error	333	26.78		
TOTAL	343			

Table 7

Raw Regression Coefficients

Covariate	Coefficient
Pretest score	.296
Formal education	.874
Teaching choice	-1.298
Professional organizations	-2.319
Teaching home economics	.531
Age of teacher	-2.533
Class enrollment	-.062
Number of foods classes taught	.308